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(54) Title: CLEAR COSMETIC GEL COMPOSITION

(57) Abstract

Disclosed is a clear cosmetic gel composition in the form of a water-in-oil emulsion, and methods of forming and of using the composition. The composition has a water-based phase containing water, a cosmetically active ingredient, and at least one coupling agent; and an oil-based phase containing a material having a refractive index in the range of 1.40 - 1.50, silicone fluids and an alkoxyLATED, alkyl substituted siloxane surface active agent (e.g., dimethicone copolyol). The composition has a refractive index in a range of 1.4026 to 1.4150. Where the cosmetically active ingredient is an antiperspirant active ingredient, the composition can be an antiperspirant gel (e.g., soft gel) composition. In the refractive index range of the present invention, increased amounts of, e.g., antiperspirant active ingredient, and other high-refractive-index materials providing cosmetic benefits, can be incorporated in the water and oil phases of the composition while still achieving a clear composition. The composition can also include polypropylene glycols (e.g., tripropylene glycol), as part of the water-based phase, to provide a composition having reduced tackiness and reduced whitening (decreased residue); this composition is also mild (reduced skin irritation potential) relative to comparable commercial products.

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DescriptionClear Cosmetic Gel CompositionTechnical Field

The present invention is directed to a clear cosmetic gel composition (for example, a clear soft gel antiperspirant composition) that is a water-in-oil emulsion. The composition of the present invention can include deodorant and/or antiperspirant active materials, to combat body malodor, for example, in axillary regions of the human body, by applying the composition to the human body (for example, to the skin, in axillary regions of the body).

The present invention is particularly directed to cosmetic gel compositions, including antiperspirant and deodorant gel compositions, that have reduced whitening and tack, and reduced skin irritation, and which can include increased amounts of the cosmetically active ingredient (for example, increased amounts of antiperspirant active ingredient), and can include other commercially beneficial materials, yet which can be provided as a clear gel product.

Background Art

Antiperspirant products are well known in the art. Antiperspirants have appeared in the marketplace in varied dosage forms, such as sticks, soft solids, soft gels, roll-on, aerosols and creams. Generally, these dosage forms include a solution of the active ingredient in a suitable solvent, a suspension of the active ingredient in a non-solvent, or a multiphasic dispersion or emulsion in which a solution of the active ingredient is

dispersed in some continuous phase or in which the solubilized active ingredient constitutes a continuous phase.

5        Of the above-referred-to dosage forms, the stick form is an example of a solid form, and the soft solid and soft gel are thickened forms which may or may not be solid (for example, under some circumstances, gels can flow). The stick form can be distinguished from a soft solid or soft gel in that, in a stick, the formulated product can retain its shape for extended time periods outside the package, the product not loosing its shape significantly (allowing for some shrinkage due to solvent evaporation). Adjustment of amounts of 10      gelling or thickening agents can be used in order to 15      form a soft gel or stick.

20       Soft gels or soft solids can be suitably packaged in containers which have the appearance of a stick, but which dispense through apertures (for example, slots or pores) on the top surface of the package. The soft solid products have also been called soft sticks or "smooth-ons", and hereinafter are generically called "soft solids". Reference is made to U.S. Patent No. 5,102,656 to Kasat, 25      No. 5,069,897 to Orr, and No. 4,937,069 to Shin, each of which discloses such soft solids, including physical characteristics thereof such as viscosity and hardness. The contents of each of these three U.S. Patents are incorporated herein by reference in 30      their entirety.

Recently, there has been significant activity in developing clear and translucent antiperspirant sticks and soft gels, particularly to provide sticks and soft gels having increased efficacy (for

example, by providing increased amounts of the antiperspirant active in the sticks and soft gels), improved cosmetic characteristics (including reduced whitening, reduced residue and reduced tack), and  
5 reduced skin irritation potential (e.g., providing a product that is "mild") .

Clear or translucent antiperspirant sticks consisting essentially of a solution of the active antiperspirant material in a polyhydric alcohol vehicle, gelled by dibenzylidene monosorbitol acetal, have been disclosed. Since the gelling agent is inherently unstable in an acidic environment, and since conventional active antiperspirant materials are acidic, much work has been involved in  
10 discovering suitable stabilizing or buffering agents to prevent or slow down acid attack on the acetal gelling agent. Such work has not been completely successful. Moreover, these clear or translucent antiperspirant sticks, containing the acetal gelling agent and including a solubilized active  
15 antiperspirant material, have the disadvantage of being inherently tacky. Thus, development work in connection with these clear or translucent antiperspirant sticks containing the acetal gelling agent has focused on discovering suitable anti-tack  
20 agents for this dosage form. However, since acid hydrolysis of the gelling agent occurs more rapidly in aqueous solutions, formulators have been forced to avoid using water in the formulations. This  
25 severely restricts the ability of the formulator to develop cosmetically elegant formulations which are simultaneously chemically stable, optically clear, low in tack, low in residue and which have  
30 acceptable application aesthetics.

Various other gelling agents have been utilized in antiperspirant and deodorant products. For example, clear stick deodorant compositions have been available for some time. The clear deodorant sticks are generally produced by using stearate soaps as gelling agents for an alcoholic or glycolic solution of an antimicrobial agent and a fragrance. These deodorant products offer no antiperspirant protection (that is, these deodorant products do not reduce flow of perspiration from a human). Conventional antiperspirant active ingredients, which are acidic, are not ordinarily used with stearate soap gelling agents, because they are incompatible with the stearate soap gelling agents, due to the chemical interaction between the antiperspirant active material and the soap and consequent inactivation of the antiperspirant active material.

Gelling, for cosmetic compositions, may also be achieved through the use of cellulosic or algin-derived polymer materials. Most of these materials are incompatible with conventional antiperspirant active ingredients, at levels of the antiperspirant active ingredients required to obtain antiperspirant efficacy. Moreover, the polymer materials are unstable at the low pH normally encountered in antiperspirant products.

Concerning wax and soap-gelled sticks, see each of U.S. Patent No. 4,382,079 to Marschner, No. 4,414,200 to Murphy, et al., No. 4,280,994 to Turney, No. 4,265,878 to Keil, No. 3,259,545 to Teller, No. 2,970,083 to Bell, No. 2,933,433 to Teller, et al., No. 2,900,306 to Slater, No. 2,857,315 to Teller, and No. 4,383,988 to Teng.

U.S. Patent No. 4,948,578 to Burger, et al discloses a transparent antiperspirant stick which is an oil-in-water emulsion, containing specific amounts of an antiperspirant effective aluminum salt, a nonionic surfactant which is a C<sub>11</sub>-C<sub>18</sub> fatty alcohol alkoxylated with from about 10 to about 20 moles ethylene oxide, a liquid oil immiscible with water, and water, the composition being free of any wax matrix. Illustratively, aluminum chlorhydrate is the antiperspirant salt, the nonionic surfactant is a C<sub>11</sub>-C<sub>18</sub> alcohol ethoxylate, and the liquid oil component may be selected from emollient oils, volatile silicones and mixtures of these materials.

U.S. Patent No. 4,944,938 to Potini discloses clear, non-alcoholic, quick drying, antiperspirant and deodorant gels, which are stable both at room temperatures and at higher temperatures, are non-stinging and leave no white residue on the skin, the gel not including gelling agents, waxes, clays, or monohydric alcohols having 2-8 carbon atoms. The gels use 3-5 carbon atom trihydric alcohols as coupling agents, these alcohols acting as solubilizers in the system and keeping the system stable and clear. The gels can include an aluminum active salt; a volatile water-insoluble emollient, such as isostearyl benzoate; a soluble emollient such as cetyl ether; solubilizers such as propylene glycol and glycerine; volatile siloxanes; and water.

Some cellulosic materials, such as hydroxypropylcellulose, among others, are compatible with polyvalent metal salts and have been used in the manufacture of clear lotions. These cellulosic

materials, however, must be prepared with a high percentage of water or alcohol in order to insure solubilization of the active ingredient. The resulting formulations, in addition to a high 5 irritation potential, are tacky and pituitous, and low in efficacy, when alcohol-based; and exhibit tackiness and a long drying time when water-based.

Clear or translucent antiperspirant soft gels (which have been dispensed from containers having the appearance of stick) have recently been 10 marketed, consisting of viscous high-internal-phase emulsions. These soft gels exhibit some advantages over the aforementioned sticks, particularly acetal-based clear sticks, in that the selection of 15 formulation ingredients is less restricted (for example, water can be used), and often tack can be reduced significantly. Concerning these emulsions, note U.S. Patent No. 4,673,570 to Soldati and No. 4,900,542 to Parrotta, et al. These two U.S. 20 patents disclose clear gelled antiperspirant compositions free of waxes and conventional gelling agents, containing a volatile silicone fluid, a silicone emulsifier, a destabilizing auxiliary emulsifier, water, non-volatile emollient, a 25 coupling agent, an active antiperspirant component and ancillary agents such as perfume, coloring agents, etc. The silicone emulsifier is a cyclomethicone-dimethicone copolyol silicone fluid marketed by Dow Corning Corp. under the trademark 30 DOW CORNING 3225C formulation. The contents of these two U.S. patents are incorporated herein by reference in their entirety.

Also to be noted is PCT (International application) Publication No. WO 92/05767. This 35 patent document discloses a clear gel-type cosmetic

product having a viscosity of at least about 50,000  
cps at 21°C and a refractive index of 1.3975-  
1.4025 at 21°C, and having an optical clarity better  
than 50 NTU (Nephelometric Turbidity Units) at 21°C,  
the product being an emulsion with a water phase  
having an active ingredient incorporated therein and  
with an oil phase. The refractive indices (measured  
at 5893Å) of the water and oil phases match to  
within 0.0004. The oil phase includes an emulsifier  
which when properly mixed with the water phase  
component yields a water-in-oil emulsion, and the  
water phase includes one or a combination of various  
polar species such as water, propylene glycol,  
sorbitol and ethanol. The water phase includes the  
deodorant and/or antiperspirant active ingredient.  
The contents of this PCT (International application)  
Publication No. 92/05767 are incorporated herein by  
reference in their entirety.

While various cosmetic gel compositions,  
including antiperspirant and deodorant compositions,  
that are clear, are known, it is still desired to  
provide a clear cosmetic gel composition (e.g.,  
clear antiperspirant and/or deodorant gel  
composition) having an increased amount of  
cosmetically active material (e.g., antiperspirant  
agent) and also having other materials providing  
advantageous cosmetic effects in the composition,  
while maintaining a clear composition; having  
reduced whitening and tack; and which is mild and  
has reduced skin irritation potential relative to  
commercially available products.

Disclosure of the Invention

It is a first object of the present invention  
to provide a clear cosmetic gel composition (for

example, a clear deodorant and/or antiperspirant gel composition) having increased amounts of cosmetically active ingredient (for example, deodorant active and/or antiperspirant active ingredients) therein, and a packaged product containing such cosmetic gel composition.

It is a further object of the present invention to provide a clear cosmetic gel composition and packaged product, wherein additional components, or additional amounts of these components, providing improved cosmetic effects, can be incorporated in the composition, while still maintaining a clear composition.

It is a further object of the present invention to provide a clear cosmetic (e.g., deodorant and/or antiperspirant) gel composition and packaged product, wherein the composition is mild (has lower skin irritation potential) as compared with commercially available products.

It is a further object of the present invention to provide a clear cosmetic (e.g., deodorant and/or antiperspirant) gel composition and packaged product, which has reduced residue, and causes a reduced amount of whitening after application.

It is a still further object of the present invention to provide a clear cosmetic (e.g., deodorant and/or antiperspirant) gel composition, and packaged product, which has improved cosmetic characteristics, including reduced tackiness after application.

It is a still further object of the present invention to provide a clear cosmetic (e.g.,

deodorant and/or antiperspirant) soft gel composition, and packaged product, which has an increased amount of active material while maintaining clarity, which has reduced whitening and residue, and which has reduced tack.

It is a still further object of the present invention to provide a clear cosmetic (e.g., deodorant and/or antiperspirant) gel composition, based on water-in-silicone oil emulsions, having increased amounts of cosmetically active ingredients therein while maintaining clarity, which is mild (has low skin irritation potential) as compared with commercially available products, and which has reduced whitening and residue, and decreased tackiness, after application.

It is a still further object of the present invention to provide a clear cosmetic (e.g., deodorant and/or antiperspirant) gel composition, based on water-in-silicone oil emulsions, having increased amounts of cosmetically active ingredients therein, and also having additional components (and/or additional amounts of other components) in the water and/or oil phase of the emulsion providing advantageous cosmetic effects (e.g., reduced whitening and reduced tack, silkier feel and a cool sensation, etc.), while maintaining clarity.

It is a still further object of the present invention to provide a method of forming, and of using, the clear cosmetic (e.g., deodorant and/or antiperspirant) gel compositions as discussed in connection with the foregoing objects.

According to a first aspect of the present invention, various of the foregoing objects are

achieved through a clear cosmetic gel composition having (1) an aqueous phase containing water and at least one cosmetically active ingredient, and (2) an oil phase containing a high refractive index  
5 material (e.g., a material having a refractive index in a range of 1.40 to 1.50), the composition further including (3) at least one coupling agent to bring the aqueous phase and the oil phase into a homogeneous composition (that is, the at least one coupling agent causes the aqueous phase to be uniformly distributed throughout the oil phase) and  
10 (4) an alkoxylated, alkyl substituted siloxane surface active agent in an amount sufficient to form the composition into a water-in-oil emulsion, the composition being a water-in-oil emulsion and having a refractive index (prior to addition of fragrance) in a range of from about 1.4026 to about 1.4150. Preferably, the refractive index of the composition is in a range of from about 1.4050 to about 1.4150,  
15 especially from about 1.4050 to about 1.4085, and most preferably the refractive index of the composition is a range of from about 1.4060 to about 1.4080. Refractive index measurements were made using a Bausch and Lomb Abbe 3L Refractometer.  
20

25 Addition of fragrance to the gel composition according to the present invention may increase the refractive index of the finished product. The refractive index referred to previously (e.g., a broadest range of 1.4026 to 1.4150) is the refractive index prior to incorporating fragrance in  
30 the composition.

35 By providing a composition having the specified refractive index, a composition containing more of the cosmetically active ingredients (in particular, more of the antiperspirant active ingredient such as

an antiperspirant active salt, where the composition is a clear antiperspirant gel composition) can be achieved.

Moreover, this composition having the specified refractive index can also include high refractive index components, in either the oil phase or the aqueous phase, or additional amounts of high refractive index components, that provide advantageous cosmetic or other aesthetic effects.

That is, conventional clear compositions have a relatively low refractive index. These relatively low refractive indices of conventional clear compositions of the water-in-oil emulsion type are due at least in part to the relatively low refractive indices of various conventionally used silicone fluids (e.g., around 1.3995), incorporated in the oil phase of these conventional compositions. This limits materials (and amounts) that can be included in the conventional composition such that the emulsion as a whole has the required relatively low refractive index. This limitation can be avoided according to the present invention, providing an increased degree of freedom in the choice of materials that can be incorporated in both the aqueous and oil phases of the composition of the present invention. For example, emollients having a higher refractive index can be incorporated in the oil phase and in the water phase, especially in the oil phase, of compositions according to the present invention, having the relatively high refractive index. Since antiperspirant active materials generally have high refractive indices, these can be incorporated in larger amounts in compositions of the present invention. Moreover, materials having a high refractive index, that can reduce tack and whitening of the composition, can be incorporated in

the oil phase of the composition of the present invention.

Desirably, the composition according to the present invention has at least near refractive index matching between (1) the aqueous phase and at least one coupling agent, on the one hand, and (2) the oil phase and alkoxylated, alkyl substituted siloxane surface active agent, on the other. In particular, preferably, according to the present invention, a difference between the refractive index of (1) the aqueous phase and at least one coupling agent, and (2) the oil phase and alkoxylated, alkyl substituted siloxane surface active agent, is less than 0.0005.

Compositions according to the present invention can be clear. For example, illustratively, the composition according to the present invention has an optical clarity better than approximately 50 NTU (Nephelometric Turbidity Units) at room temperature (20°-25°C), preferably having a turbidity measurement of less than approximately 30 NTU, more preferably less than approximately 20 NTU. Turbidity measurements as discussed in the foregoing and discussed hereinafter, were made with an Orbeco-Hellige #965 Direct-Reading Turbidimeter.

Where the cosmetic gel composition of the present invention includes an antiperspirant active agent as the cosmetically active ingredient, with such agent being incorporated in the composition in an amount sufficient to reduce flow of perspiration when the composition is applied to a human, a clear antiperspirant gel composition can be formed. Various conventional antiperspirant active aluminum-containing salts, including (but not

5 limited to) aluminum chlorhydrate and aluminum zirconium tetrachlorohydrex gly, can be utilized as the antiperspirant active agent. Thus, a clear antiperspirant gel composition can be achieved, according to the present invention.

10 The composition according to the present invention can be a soft gel, for example, having a viscosity in a range from about 75,000 cps to about 350,000 cps at room temperature (20°-25°C). Such a soft gel can be incorporated in conventional dispensing packages (for example, dispensing packages having slots or pores on the top thereof for extruding the gel to the upper surface, for rubbing the composition on the skin from such upper 15 surface).

20 Desirably, the oil phase of the cosmetic gel composition according to the present invention includes a volatile silicone fluid, a non-volatile silicone fluid and an emollient. Preferably, such emollient, which can be a silicone material (such as phenyl trimethicone), is the material of the oil phase having the high refractive index, and has a refractive index higher than that of the volatile silicone fluid and higher than that of the 25 non-volatile silicone fluid (that is, this emollient is, desirably, a high refractive index emollient compatible with the silicone fluids of the oil phase).

30 According to another aspect of the present invention, the aqueous phase of the clear cosmetic gel composition further includes at least one polypropylene glycol. Illustratively, tripropylene glycol can be utilized as the polypropylene glycol. According to this aspect of the present invention,

propylene glycol can be used in combination with the polypropylene glycols. Incorporation of the polypropylene glycol in the gel composition improves cosmetic properties, including a reduction of tack and a decrease in the whitening and in the residue after application of the composition. Moreover, compositions incorporating polypropylene glycol, particularly, tripropylene glycol, have improved mildness (that is, reduced skin irritation potential) relative to commercially available products.

The objectives according to the present invention are also achieved through the method of forming the cosmetic gel composition according to the present invention. In this method, an aqueous-based phase comprising water; a cosmetically active ingredient; and a coupling agent is formed. Also formed is an oil-based phase containing at least a high refractive index material (a material having a refractive index in the range of 1.40 to 1.50) and an alkoxyolated, alkyl substituted siloxane surface active agent, and desirably other silicone fluids. The refractive index of the oil-based phase is determined, and, if necessary, adjusted to be in the range from about 1.4026 to about 1.4150, and the refractive index of the aqueous-based phase is determined and adjusted (if necessary) to differ from the refractive index of the oil-based phase by less than 0.0005. The aqueous-based phase is then mixed with the oil-based phase (for example, the aqueous-based phase is slowly added to the oil-based phase with turbulent agitation), and then additional additives, such as fragrance and color or other active ingredients, are added with mixing. The resulting emulsion is then passed through, for example, a colloid mill or other high shear

emulsifier so as to provide a viscous gel, the gel then being transferred to a suitable applicator or container for use by the consumer. Desirably, according to the present invention the aqueous based phase further includes polypropylene glycol, such as tripropylene glycol, providing advantages in the final product as discussed previously.

The compositions according to the present invention are used as conventional cosmetic gel compositions are used. For example, where the composition according to the present invention is a clear antiperspirant soft gel composition, packaged in a dispensing container having a top surface with slots or pores, the gel is extruded from the dispensing container through the slots or pores and applied to the skin (for example, in axillary regions of the human body) by rubbing the soft gel material extruded through the top surface of the container on the skin in the axillary region.

As a further aspect of the present invention, the dispensing container is a clear container, so as to exhibit the clarity of the composition of the present invention.

Accordingly, by the present invention, a clear cosmetic gel composition (for example, a clear antiperspirant gel composition, such as a clear antiperspirant soft gel composition) can be provided, having increased amounts of cosmetically active ingredients (such as antiperspirant active material) and having other high refractive index beneficial materials in the composition while maintaining clarity of the composition. The composition is easy to manufacture. The composition has improved tack, a cool sensation, a

silky feel and imparts no white residue on dry down compared to commercially available products. Moreover, compositions of the present invention incorporating a polypropylene glycol component (especially tripropylene glycol) have improved 5 mildness (have reduced skin irritation potential) as compared to commercially available products, and have improved cosmetic properties (including reduced tackiness) and reduced white residue upon 10 application.

Best Mode for Carrying Out the Invention

While the invention will be described in connection with specific and preferred embodiments, it will be understood that it is not intended to 15 limit the invention to those embodiments. To the contrary, it is intended to cover all alterations, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

Throughout the present disclosure, the present invention is described primarily in connection with a clear soft gel antiperspirant composition. However, the present invention is not limited to soft gel compositions or to antiperspirant 20 compositions. For example, compositions according to the present invention can be clear deodorant compositions. Moreover, depending on additional or other active ingredients included in the composition, the composition can also be an emollient composition, an analgesic (methyl 25 salicylate) composition, a sunscreen composition, etc. Various active materials incorporated in 30 cosmetic compositions are disclosed in U.S. Patent

No. 4,322,400 to Yuhas, the contents of which are incorporated herein by reference in their entirety.

Throughout the present specification, "active antiperspirant" and "active deodorant" materials are discussed. Both types of materials contribute to reduction of body (e.g., axillary) malodor. By reduction of body malodor, we mean that, generally, there is less body malodor after application of a composition to the person's skin as compared to the person's body malodor without application of the composition. Such reduction can be due to a masking of the malodor, absorption and/or chemical reaction of the malodorous material, reduction of levels of the bacteria producing the malodorous material, e.g., from perspiration, reduction of perspiration, etc. The antiperspirant active materials, when utilized in an antiperspirant effective amount in the composition, act to reduce body malodor by reducing production of perspiration; however, these antiperspirant active materials can also have a deodorant function, e.g., as an antimicrobial agent. The deodorant active materials do not substantially reduce the production of perspiration, but reduce malodor in other ways, e.g., as fragrances masking the malodor or reducing the malodor intensity, as odor absorbents, as antimicrobial agents, as agents chemically reacted with malodorous materials, etc.

Throughout the present specification, where compositions are described as including or comprising specific components or materials, it is contemplated by the inventors that the compositions of the present invention also consist essentially of, or consist of, the recited components or materials. Accordingly, throughout the present disclosure any described composition of the present

invention can consist essentially of, or consist of, the recited components or materials.

A desired feature of the present invention is that a clear, or transparent, cosmetic gel composition (e.g., clear or transparent deodorant or antiperspirant gel composition) can be provided. The term clear or transparent (that is clarity), according to the present invention, is intended to connote its usual dictionary definition; thus, a clear, e.g., cosmetic gel composition of the present invention allows ready viewing of objects behind it. By contrast, a translucent composition allows light to pass through, but causes the light to be so scattered that it will be impossible to see clearly objects behind the translucent composition. Optical clarity of compositions of the present invention can be measured using a turbidimeter, and desirably is better than 50 NTU measured at room temperature (20°-25°C).

The present invention contemplates a clear cosmetic gel composition which is a water-in-oil emulsion. The aqueous phase of this emulsion contains water and at least one cosmetically active ingredient, with the cosmetically active ingredient being in the composition in an amount so as to have a cosmetic effect. The oil phase of the emulsion includes a high refractive index material (a material having a refractive index in the range of 1.40-1.50), and desirably also includes silicone fluids, and preferably contains both volatile and non-volatile silicone fluids. The compositions according to the present invention also include at least one coupling agent to bring the aqueous phase and the oil phase into a homogeneous composition,

and an alkoxyolated, alkyl substituted siloxane surface active agent to provide a water-in-oil emulsion. According to this aspect of the present invention, the composition has a refractive index in 5 a range from about 1.4026 to 1.4150. This range for the refractive index is higher than the maximum of the range described in PCT International Application Publication No. WO 92/05767. By utilizing a higher refractive index, in a range as disclosed in the 10 present application, clarity of the composition can be maintained, while increased amounts of cosmetic active ingredient (e.g., antiperspirant active ingredient such as an antiperspirant aluminum-containing salt) can be incorporated in the 15 composition; and high refractive index materials providing advantageous benefits to the composition can be incorporated in the aqueous and oil phases of the composition.

The material, incorporated in the oil phase, 20 which has the high refractive index, desirably is an emollient, and preferably has a refractive index in the range of 1.43 to 1.47, most preferably 1.45 to 1.47.

Desirably, refractive indices of the mixture of 25 aqueous phase and at least one coupling agent, on the one hand, and the mixture of the oil phase and alkoxyolated, alkyl substituted siloxane surface active agent, on the other, match each other to within 0.0005; that is, a difference between (1) the refractive index of the mixture of aqueous phase 30 and coupling agents and (2) the refractive index of the mixture of oil phase and alkoxyolated, alkyl substituted siloxane surface active agent, is less than 0.0005.

5 An optically clear cosmetic (e.g., antiperspirant or deodorant) gel composition that is visually clear, and, like glass, allows for the viewing of the objects behind it, is achieved. In particular, a composition having an optical clarity better than 50 NTU at room temperature (20°-25°C), preferably having a turbidity measurement less than 30 NTU, more preferably less than 20 NTU, can be achieved.

10 Moreover, the clear cosmetic gel composition of the present invention, which is in the form of a macro-emulsion as contrasted to a micro-emulsion, does not need to contain wax or gelling agents such as soaps, cellulosic materials or algenites.

15 Furthermore, the composition according to the present invention does not require polydimethylcyclosiloxane, although the present compositions may contain this material.

20 The gel emulsions according to the present invention are stable and optically clear, are cosmetically elegant, and are capable of being delivered from a suitable applicator package. They are easily applied to the skin and have a smooth, silky feel and a cool sensation, yet are fast-drying  
25 and non-tacky. These compositions of the present invention may be prepared by a batch process, or a continuous or semi-continuous process, and the processes yield compositions which are stable, highly efficacious and possess excellent aesthetic qualities.

30 Where the composition is an antiperspirant gel composition, any of the known antiperspirant active materials can be utilized in the composition of the present invention. Suitable materials which may be

mentioned by way of example include aluminum chlorhydrate, aluminum chloride, aluminum sesquichlorohydrate, aluminum-zirconium hydroxychlorides, complexes or adducts of the above-mentioned active ingredients with glycol, such as propylene glycol (for example, "Rehydrol" II from Reheis Chemical Co.), and combinations thereof.

Known aluminum-zirconium salts in combination with neutral amino acids, such as glycine (e.g., aluminum-zirconium tetrachlorohydrex Gly) can also be used. Generally, any of the Category I active antiperspirant ingredients, listed in the Food and Drug Administration's Monograph on Antiperspirant Drug Products for overall-the-counter human use (October 10, 1973) can be used. In addition, any new ingredient, not listed in the Monograph, such as aluminum nitratohydrate and its combination with zirconyl hydroxychlorides and nitrates, or aluminum-stannous chlorohydrates, can be incorporated as an antiperspirant active ingredient in antiperspirant compositions according to the present invention.

Antiperspirant active materials can be, but are not limited to, the following:

25                   Antiperspirant Actives

Astringent salt of aluminum  
Astringent salt of zirconium  
Aluminum bromohydrate  
Aluminum chlorohydrate  
30                  Aluminum dichlorohydrate  
Aluminum sesquichlorohydrate  
Aluminum chlorohydrex PG  
Aluminum dichlorohydrex PG  
Aluminum sesquichlorohydrex PG  
35                  Aluminum chlorohydrex PEG  
Aluminum dichlorohydrex PEG  
Aluminum sesquichlorohydrex PEG  
Aluminum chloride  
Aluminum sulfate

5           Aluminum zirconium chlorohydrate  
Aluminum zirconium trichlorohydrate  
Aluminum zirconium tetrachlorohydrate  
Aluminum zirconium pentachlorohydrate  
Aluminum zirconium octachlorohydrate  
Aluminum zirconium trichlorohydrex Gly  
Aluminum zirconium tetrachlorohydrex Gly  
Aluminum zirconium pentachlorohydrex Gly  
Aluminum zirconium octachlorohydrex Gly  
10          Buffered aluminum sulfate  
Potassium alum  
Sodium aluminum chlorohydroxy lactate

15          The preferred antiperspirant materials include Rezal 36G, aluminum zirconium tetrachlorohydrate or aluminum chlorhydrate.

20          The amount of active component that can be used will vary with the particular active ingredient incorporated. As a general rule, an antiperspirant product should contain an active antiperspirant material in an amount anywhere from about 10% to about 35% by weight, of the total weight of the composition, more preferably from about 20% to about 30% by weight, of the total weight of the composition. The active antiperspirant material utilized in the compositions of the present invention can be pre-dissolved in water or in another solvent (for example, in propylene glycol), or can be in powdered form, and may be buffered or unbuffered. Preferably, the antiperspirant materials are present in solution in a solvent therefor.

25          Where a deodorant active material is utilized, any deodorant active material which can be dissolved in the aqueous phase can be utilized.  
30          Illustratively, the deodorant active material can be 2, 4, 4'-trichloro-2'-hydroxy diphenyl ether (triclosan), and/or benzethonium chloride. Where

the deodorant ingredient is used in place of the antiperspirant active ingredient, a deodorant gel composition (rather than an antiperspirant gel composition) would be provided.

5       Amounts of cosmetically active ingredients incorporated are those sufficient to have a cosmetic effect. For example, where a deodorant active ingredient such as triclosan is incorporated, amounts thereof as conventionally used in the art  
10      can be incorporated in the composition according to the present invention.

15      The aqueous phase includes one or a combination of various polar species, and includes at least water (refractive index of 1.3333). Other polar species include polyhydric alcohols and derivatives thereof (e.g., esters and ethers thereof). Illustratively, water can be included in the composition in an amount in the range of 20% to 70% by weight, of the total weight of the composition.

20      At least one coupling agent is included in the composition of the present invention. Such coupling agent is illustratively (but not limited to) the following:

25      Ethyl alcohol  
          2-ethylhexanol  
          Ethylene carbonate  
          N-methylglucamine  
          Linear ethoxylated polymer of methanol  
          Ethylene glycol monoethyl ether  
30      Diethylene glycol monoethyl ether  
          Propoxylated oleyl alcohol  
          Butyl stearate  
          Butyl myristate  
          Isopropyl alcohol  
35      SD-40 alcohol  
          Mineral Spirits  
          PPG (2-8) myristyl ether  
          PPG (2-8) lauryl ether  
          Dipropylene glycol  
40      Sorbitol

5            PPG (2-10) cetyl ether  
          PEG-6 diisopropyl adipate  
          Methoxy PEG-22 dodecyl-glycol copolymer  
          PEG-30 Glyceryl monoacetate sorbitol  
          PEG-3 oleyl ether phosphate  
          PEG-(2-5) oleyl ether  
          PPG-(2-5) lanolate  
          PPG-(2-8) isostearate  
          Propylene glycol (2) methyl ether  
10          PPG-(2-3) methyl ether  
          PPG-14 butyl ether  
          Ethoxylated (2-20 moles) glucose  
          Propoxylated (2-20 moles) glucose  
          PPG-15 Stearyl ether  
15          PPG-(5-20) methyl glucose ether  
          Isoprene glycol  
          Propylene carbonate  
          Glycerine

20          This coupling agent acts to stabilize the emulsion and also acts as a clarifying agent. Moreover, various of these coupling agents, such as SD-40 alcohol, aid in drying and has a cooling effect, providing advantageous aesthetic properties for the composition.

25          The coupling agent is preferably a low molecular weight alcohol such as, but not limited to, an alcohol having from about 2 to about 10 carbon atoms, preferably from about 2 to about 4 carbon atoms; or a glycol such as, but not limited to, propylene glycol, ethylene glycol, isoprene glycol and dipropylene glycol; glycerine, sorbitol and/or propylene carbonate. The coupling agent can be one compound or a mixture of compounds.

30          Illustratively, the coupling agent is present in an amount of from about 10% to about 30% by weight, preferably from about 14% to about 25% by weight, of the total weight of the composition.

The oil phase according to the present invention is, desirably, a silicone oil phase, so as to provide a water-in-silicone oil emulsion. The total of oil phase and siloxane surface active agent preferably makes up from about 8% to about 30% by weight, of the total weight of the composition. This surface active agent is an emulsifier which, when properly mixed with the aqueous phase components, oil phase components and coupling agents, yields a water-in-oil emulsion. The oil phase is desirably a blend of liquids.

The oil phase can include, illustratively, a volatile silicone fluid such as cyclomethicone and a non-volatile silicone fluid such as dimethicone; however, the composition of the present invention need not include both the volatile and non-volatile silicone fluids. Where the composition includes the volatile silicone, it is preferred that such volatile silicone be a polydimethylcyclosiloxane, present in an amount up to about 18% by weight, of the total weight of the composition, preferably from about 4% to about 12% by weight, of the total weight of the composition. Preferred polydimethylcyclosiloxanes are those named cyclomethicones, exemplified by the formula  $((\text{CH}_3)_2\text{SiO})_x$ , where  $x$  is a number from about 4 to about 6. Preferred cyclosiloxanes are octamethylcyclotetrasiloxane ( $x=4$ ), decamethylcyclopentasiloxane ( $x=5$ ) and blends of tetramer and pentamer cyclomethicones. Commercial cyclosiloxanes which can be utilized as part of the composition of the present invention include, illustratively, Dow Corning 244 fluid, Dow Corning 245 fluid, Dow Corning 344 fluid and Dow Corning 345 fluid (from Dow Corning Corp.).

5       The oil phase preferably is a mixture of a volatile silicone fluid (such as cyclomethicone), a non-volatile silicone fluid (such as dimethicone), and a high refractive index compatible emollient such as phenyl trimethicone. This high refractive index emollient has a higher refractive index than that of the silicone fluids (volatile silicone fluid and/or non-volatile silicone fluid) of the oil phase.

10      The alkoxylated, alkyl substituted siloxane surface active agent is preferably, but not limited to, a dimethicone copolyol. An illustrative alkoxylated silicone-containing surfactant utilizable according to the present invention is 15      cetyl dimethicone copolyol, referred to in U.S. Patent No. 5,162,378 to Guthauser. Illustratively, the alkoxylated, alkyl substituted siloxane surface active agent is included in the composition in an amount of 0.2% to 2% by weight, of the total weight 20      of the composition.

25      A specific cyclomethicone-dimethicone copolyol fluid which can be utilized to provide the alkoxylated silicone containing surface active agent is a mixture of cyclomethicone and dimethicone copolyol designated as DC3225C from Dow Corning Corp. This is a polyether substituted silicone of cyclomethicone and dimethicone copolyol (refractive index (RI) = 1.3994). This DC3225C, which is an emulsifying agent, is useful for preparing stable 30      water-in-oil emulsions where a silicone makes up a large portion of the oil phase, and is a dispersion of a silicone surfactant (dimethicone copolyol) (10% by wt.) in cyclomethicone (Dow Corning 344 Fluid) (90% by wt.).

The mixture of cyclomethicone and dimethicone copolyol fluid is present in the composition, illustratively, in an amount of from about 4% to about 20% by weight, of the total weight of the composition.

5

Various materials incorporated in the water-based phase and in the oil-based phase, and their refractive indices (as measured using the Bausch and Lomb Abbe 3L Refractometer), are 10 set forth in the following:

Water-based phase

	<u>Ingredient</u>	<u>RI at 21°C</u>
15	Al-Zr Tetrachlorohydrex GLY (Rexal 36G (cone) 46%)	1.4185
	SD40 Alcohol	1.3644
	PPG-10 Butanediol	1.4510
	Propylene Glycol	1.4334
	1,3-Butylene Glycol	1.4404
	Dipropylene Glycol	1.4415
	Propylene Carbonate	1.4216
20	Sorbitol (70%)	1.4605
	Isoprene Glycol	1.4422
25	Tween 80	1.4725
	Carbowax PEG 200	1.4589
	Carbowax PEG 300	1.4650
	Carbowax PEG 400	1.4671
	Tween 20	1.4705
	Water (Deionized)	1.3336
	Glycerine	1.4743

30

Oil-based phase

	<u>Ingredient</u>	<u>RI at 21°C</u>
35	Dimethicone (DC 200 (50cs))	1.4049
	Phenyl Trimethicone (DC 556)	1.4614
	Polyisobutylene (Panalane L-14E)	1.4592
	Diisopropyl adipate (Dermol DIA)	1.4248
	Polydecene (Silkflo 362NF)	1.4448
	Polydecene (Silkflo 364NF)	1.4554
	Polydecene (Silkflo 366NF)	1.4595
40	Diisopropyl Sebacate (Pelemol DIPS)	1.4337
	Octyl Isononanoate (Dermol 89)	1.4366

Isostearyl Stearate (Estalon ISS)	1.4565
Dermol G-76	1.4988
DC Q2-5220	1.4536
DC 3225C	1.3994

5           The composition according to the present invention can include additional cosmetically active ingredients such as emollients, humectants, antiseptics, antioxidants, chelating agents, ultraviolet absorbers, colorants, fragrances and  
10          preservatives, as known in the art, which ingredients include, but are not limited to, the following:

Emollients

15	Stearyl alcohol	Stearic acid
	Glyceryl monoricinoleate	Isobutyl palmitate
	Glyceryl monostearate	Isocetyl stearate
	Sulphated tallow	Oleyl alcohol
	Propylene glycol	Isopropyl laurate
	Mink oil	Sorbitan Stearate
20	Cetyl alcohol	Hydrogenated Castor Oil
	Stearyl stearate	Hydrogenated soy glycerides
	Isopropyl isostearate	Hexyl laurate
25	Dimethyl brassylate	Decyl oleate
	Diisopropyl adipate	
	n-dibutyl sebacate	
	Diisopropyl sebacate	
	2-ethyl hexyl palmitate	
30	Isononyl isononanoate	
	Isodecyl isononanoate	
	Isotridecyl isononanoate	
	2-ethyl hexyl palmitate	
	2-ethyl hexyl stearate	
35	D-(2-ethyl hexyl) adipate)	
	Di-(2-ethyl hexyl) succinate	
	Isopropyl myristate	
	Isopropyl palmitate	
	Isopropyl stearate	

Emollients cont.

5           Octacosanol  
 Butyl stearate  
 Glyceryl monostearate  
 Polyethylene glycols  
 Oleic acid  
 Triethylene glycol  
 Lanolin  
 Castor Oil  
 10          Acetylated lanolin alcohols  
 Acetylated lanolin  
 Petrolatum  
 Isopropyl ester of lanolin  
 fatty acids  
 15          Mineral oils  
 Butyl myristate  
 Isostearic acid  
 Palmitic acid  
 PEG-23 oleyl ether  
 20          Oleyl Oleate  
 Isopropyl linoleate  
 Cetyl lactate  
 Lauryl lactate  
 Myristyl lactate  
 25          Quaternised hydroxy alkyl  
 aminogluconate  
 Vegetable Oils  
 Isodecyl oleate  
 Isostearyl neopentanoate  
 30          Myristyl myristate  
 Oleyl ethoxy myristate  
 Diglycol stearate  
 Ethylene glycol monostearate  
 Myristyl stearate  
 35          Isopropyl lanolate  
 Paraffin waxes  
 Glycyrrhizic acid  
 Hydroxyethyl stearate amide

Humectants

40	Urea	Propylene glycol
	Glycerin	Butylene glycol
	Sorbitol	Ethyl hexanediol
	Sodium 2-pyrrolidone-5-carboxylate	C <sub>1-10</sub> polyethylene glycols
45	Soluble collagen	Hyaluronic acid
	Dibutyl phthalate	Lactic acid
		Sodium pyrrolidone carboxylate
50	Gelatin	Sodium lactate
	Polyglycerogen	Orotic acid

Antiseptics/Preservatives/Antioxidants/  
Chelating Agents

5           Cetyl pyridinium chloride  
          Tribromosalicylanilide  
          Benzalkonium chloride  
          Dehydroacetic acid  
          Methyl paraben  
          Propyl paraben  
          Sodium dehydroacetate  
 10          Quaternium-15  
          EDTA Benzyl alcohol  
          Chlorobutanol  
          Dichlorobenzyl alcohol  
          Phenethyl alcohol

15          Antiseptics/Preservatives/Antioxidants/Chelating  
Agents cont.

20	Phenoxyethanol Propylene glycol Chloroacetamide Imidazolidinyl urea Butyl paraben Butylated Hydroxy Anisol Ethyl paraben	5-bromo-5-nitro-1,3-dioxane Glutaral Tocopherol Zinc pyritone Sodium borate Boric acid Isobutyl paraben 2-(hydroxymethylamine) -ethanol
25	5-chloro-2-methyl -4- isothiazolin-3-one	Paraformaldehyde Trimerosol Dodecyl gallate
30	2-methyl-4-isothiazol- 3-one formaldehyde Butylated Hydroxy Toluene DMDM hydantoin	Hydroquinone Phenol Sodium pyritone Stearalkonium chloride
35	2-bromo-2-nitropropane- 1,3-diol Sorbic acid Citric acid Triclosan Diazolidinyl urea Benzoic acid Propyl gallate Sodium benzoate Potassium sorbate Chloroxylenol Tetrapotassium pyrophosphate Benzoxiquine	
40		
45		

5           Chlorobutanol  
 Quaternium-11  
 U.V. absorber-1  
 Disodium phosphate  
 Trisodium HEDTA  
 Benzethonium chloride  
 Sodium methyl paraben  
 DMHF  
 10          MDM hydantoin  
 O-phenylphenol  
 Chlorhexidine digluconate  
 Myristalkonium chloride  
 Ascorbylpalmitate  
 Isopropyl paraben  
  
 15          Quaternium-15  
 Benzylparaben  
 Phenylethyl alcohol  
 Phosphoric acid  
 Sodium O-phenyl phenate  
 20          Chlorhexidine dihydrochloride  
 Phenoxyisopropanol  
 Resorcinol  
 Dichlorophen, sodium salt  
 T-butyl hydroquinone  
 25          Dichlorophen  
 Methylbenzethonium chloride  
 Chlroacetamide  
 Phenylmercuric acetate  
 Ascorbic acid  
 30          Benzyl benzoate  
 Hydantoin  
 Sodium sulfite  
 Sodium bisulfite  
 Iodine

35           U.V. Absorbers

40          2-hydroxy-4-methoxybenzophenone         ethylhexylsalicylate  
 Octyl dimethyl p-aminobenzoic acid             Menthyl anthranilate  
 45          p-dimethyl aminobenzoate  
 Digallyl trioleate  
 2,2-dihydroxy-4-methoxy benzophenone  
 Ethyl 4-[bis(hydroxypropyl)] aminobenzoate  
 50          2-ethylhexyl 2-cyano-3,3-diphenylacrylate  
 Ethyl hexyl p-methoxy cinnamate2-  
 Ethyl 4(bis(hydroxypropyl))

aminobenzoate  
2-phenylbenzimidazole-5-  
sulfonic acid  
Benzophenone-8  
5 Benzophenone-6  
Benzophenone-2  
Benzophenone-1  
Amyl dimethyl PABA  
Benzophenone-4  
10 Benzophenone-9

According to another aspect of the present invention, the aqueous phase further includes at least one polypropylene glycol, preferably tripropylene glycol. By including, e.g., 15 tripropylene glycol in the composition, illustratively, in an amount in the range of 1% to 20% by weight, of the total weight of the composition, a clear cosmetic (e.g., antiperspirant) gel composition can be achieved, having desirable 20 cosmetic properties such as reduced tack and reduced whitening.

While not being held to any theory, it is also thought that use of the glycol, especially a relatively high molecular weight glycol, e.g., 25 tripropylene glycol, may reduce irritation potential by preventing other irritating agents from permeating into the skin, by preventing mechanical chafing of the skin through extended lubrication of the aluminum salt active particles on the skin 30 surface, and, where appropriate, by avoiding any irritation by propylene glycol.

According to this aspect of the present invention, the aqueous phase can include a mixture of polypropylene glycol (e.g., tripropylene glycol) and propylene glycol. Where the composition 35 includes a mixture of both tripropylene glycol and propylene glycol, the mixture illustratively can be

included in the aqueous phase in an amount in the range of 1%-25% by weight, of the total weight of the composition.

5 While not limiting, in preferred embodiments the mixture of oil phase and alkoxylated, alkyl substituted siloxane surface active agent comprises from about 10% to about 30% by weight, of the total weight of the composition, and the combination of aqueous phase and coupling agents make up from  
10 about 70% to about 90% by weight, of the total weight of the composition.

In manufacturing the composition, and to provide an optically clear product (for example, an optically clear antiperspirant product), refractive indices of a mixture of oil phase and alkoxylated, alkyl substituted silicone surface active agent, on the one hand, and a mixture of the aqueous phase and the at least one coupling agent, on the other, are measured using a suitable refractometer such as a  
15 Bausch and Lomb Abbe 3L Refractometer, and the refractive index of one of these mixtures is adjusted as necessary in order to have a refractive index of one mixture that is within 0.0005 of the other mixture. In particular, in connection with  
20 antiperspirant compositions according to the present invention, the oil phase and alkoxylated, alkyl substituted silicone surface active agent are mixed and the refractive index of the mixture is optically measured. The aqueous phase is formulated using,  
25 inter alia, the active ingredient and water, and the coupling agent is mixed therewith and the refractive index of this mixture of aqueous phase and coupling agent is optically measured. If the two mixtures do not match within 0.0005, refractive indices of  
30 either mixture can be adjusted. Preferably, the  
35

mixture including the aqueous phase has its refractive index adjusted by adding a coupling agent or water to change the refractive index so that it matches the refractive index of the mixture of oil 5 phase and surface active agent, to at least 0.0005, at 21°C. Adding the coupling agent to the aqueous phase increases the refractive index of the mixture, while adding water to the aqueous phase reduces the refractive index of the mixture. Following 10 adjustment, the mixtures are again optically measured to verify sufficient matching of the refractive indices. The mixture of the aqueous phase and coupling agent is then slowly added to the mixture of the oil phase and alkoxylated, alkyl 15 substituted siloxane surface active agent, with turbulent agitation; optionally, fragrance can then be added, and the mixture sheared (e.g., by passing the resulting emulsion through a colloid mill or other suitable high shear emulsifier) to form a 20 stable water-in-oil emulsion with desired viscosities, illustratively, in excess of 40,000 cps at room temperature (20°-25°C), preferably, between 75,000 and 350,000 cps, more preferably between 120,000 and 325,000 cps, most preferably between 25 200,000 and 325,000 cps.

After formation of the composition having the desired viscosity, the composition can then be packaged into conventional packages, using conventional techniques. For example, the gel can 30 be introduced into a dispensing package (for example, a package having a top surface with slots or pores), as conventionally done in the art. Desirably, the dispensing package is a clear package, so as to exhibit the clear composition to the purchasing consumer.

Thereafter, the product can be dispensed from this dispensing package, by extruding the gel from the dispensing package onto the top surface, through the pores or slots, and then rubbing the exposed gel on the skin, (for example, on skin in the axillary regions), so as to deposit the active material (for example, antiperspirant active material) on the skin. This provides good deposition of the antiperspirant active material, as well as other active materials, on the skin.

In the following, specific examples of compositions within the scope of the various aspects of the present invention are set forth. These specific examples are illustrative of the present invention, and are not limiting. In the following examples, as well as throughout the present specification, where appropriate the names utilized are the CTFA (Cosmetics, Toiletry and Fragrance Association, Inc.) names, as set forth in the CTFA International Cosmetic Ingredient Dictionary (4th Ed. 1991), the contents of which dictionary are incorporated herein by reference in their entirety. Amounts of each of the ingredients is in percent by weight, of the total weight of the composition.

Examples 1-6

	Example No.:	1	2	3	4	5	6
	<u>Ingredient</u>	%	%	%	%	%	%
30	ALUMINUM ZIRCONIUM TETRACHLOROHYDREX GLY (REZAL 36G CONC (46%))	54.00	54.00	54.00	54.00	54.00	54.00
	SD ALCOHOL 40		8.00	8.00	8.00	8.00	8.00
	DEIONIZED WATER	10.92	8.90	9.83	10.92	12.26	7.18
35	ISOPRENE GLYCOL	9.06					
	PROPYLENE CARBONATE	11.10					
	PROPYLENE GLYCOL			10.17			
	DIPROPYLENE GLYCOL				9.08		

Examples 1-6 con't

	<u>Example No.:</u>	1	2	3	4	5	6
	<u>Ingredient</u>	%	%	%	%	%	%
	SORBITOL (70%)					7.74	
5	GLYCERINE					12.82	
	CYCLOMETHICONE AND DIMETHICONE COPOLYOL (DC3225C)	9.00	9.00	9.00	9.00	9.00	9.00
10	DIMETHICONE 50cs (DC 200 50cs)	7.93	7.93	7.93	7.93	7.93	7.93
	PHENYL TRIMETHICONE (DC 556)	1.07	1.07	1.07	1.07	1.07	1.07

Examples 7-9

	<u>Example No.</u>	7	8	9
	<u>Ingredient</u>	%	%	%
	PHENYLTRIMETHICONE	1.07	1.07	1.07
15	DIMETHICONE COPOLYOL AND CYCLOMETHICONE (DC 3225C)	9.00	9.00	9.00
	DIMETHICONE 50 cst	7.93	7.93	7.93
	ALUMINUM ZIRCONIUM TETRACHLOROHYDREX GLY (46% solution)	54.00	54.00	54.00
20	ETHANOL (95%)	8.00	8.00	8.00
	DEIONIZED WATER	10.92	8.83	9.31
	DIPROPYLENE GLYCOL	9.08		
	TRIPROPYLENE GLYCOL		11.17	
25				
	<u>Examples 7-9</u>			
30	<u>Example No.</u>	7	8	9
	<u>Ingredient</u>	%	%	%
	PPG-425		10.69	

Examples 7-9

	<u>Example No.</u>	7	8	9
	<u>Ingredient</u>	%	%	%
	PPG-425			10.69
5	TOTAL	100.00	100.00	100.00

Examples 10 - 13

	<u>Example No.</u>	10	11	12	13
	<u>Ingredients</u>	%	%	%	%
10	ALUMINUM-ZIRCONIUM TETRACHLOROHYDREX GLY				
	(46%) (REZAL 36G CONCENTRATE)	54.00	48.00	48.00	54.00
	SD 40 ALCOHOL	8.00	8.00	8.00	8.00
	DEIONIZED WATER	9.20	11.90	11.50	8.83
15	PROPYLENE GLYCOL	10.20	6.00	10.20	---
	TRIPROPYLENE GLYCOL ----		7.50	3.70	11.17
	CYCLOMETHICONE & DIMETHICONE COPOLYOL (DC3225C)	9.00	9.00	9.00	9.00
20	DIMETHICONE 50 cs (DC 200)	7.25	7.25	7.25	7.30
	PHENYL TRIMETHICONE (DC 556)	1.75	1.75	1.75	1.70
	FRAGRANCE	0.60	0.60	0.60	---
25	TOTAL	100.00	100.00	100.00	100.00

In the foregoing Examples 10-12, the refractive index of each composition without the fragrance, was 1.4075.

Thus, according to the present invention, a clear cosmetic gel composition, which can be a soft gel, containing increased amounts of the cosmetically active ingredient (e.g. increased amounts of the antiperspirant active ingredient, where the composition is an antiperspirant gel composition), and also containing in both the oil phase and the aqueous phase high-refractive index materials providing cosmetic benefits, can be achieved, while maintaining clarity of the composition. This composition can be extruded through pores or slots of a conventional soft solid or soft gel dispensing container. The compositions are stable, even in the presence of conventional antiperspirant active aluminum-containing salts such as aluminum chlorohydrate or aluminum-zirconium tetrachlorohydrex-GLY. Compositions according to the present invention can be easily and simply manufactured. Moreover, the composition according to the present invention has reduced whitening and leaves a decreased residue after application, and has reduced tack. In addition, compositions according to the present invention have reduced skin irritation potential as compared to comparable commercial products.

#### Industrial Applicability

As is clear from the foregoing, the composition of the present invention has applicability as a cosmetic composition, having various uses depending upon the active cosmetic ingredient incorporated therein. For example, the composition of the present invention has applicability as an antiperspirant composition, for application to axillary regions of the human body to at least reduce perspiration therefrom, where an

antiperspirant active ingredient is incorporated in the composition. As a further illustration, the composition has applicability as a deodorant composition for application to axillary regions of the human body to reduce body malodor without reducing flow of perspiration, where the composition includes a deodorant active ingredient which is not an antiperspirant (e.g., an antimicrobial agent such as Triclosan, a fragrance, etc.). However, the present invention is not limited to these specific uses, and can have other uses, depending on the cosmetically active ingredient incorporated therein, and can be applied, e.g., to other parts of a body. The present invention also has applicability in forming these compositions.

While we have shown and described several embodiments in accordance with the present invention, it is understood that the same is not limited thereto, but is susceptible to numerous changes and modifications as known to one having ordinary skill in the art, and we therefore do not wish to be limited to the details shown and described herein, but intend to cover all such modifications as are encompassed by the scope of the appended claims.

CLAIMS

1. A clear cosmetic gel composition,  
comprising:

(a) an aqueous phase containing (i) water  
and (ii) at least one cosmetically active  
ingredient, the cosmetically active ingredient being  
in the composition in an amount so as to have a  
cosmetic effect;

(b) an oil phase, the oil phase including  
a material having a refractive index in the range of  
1.40 to 1.50;

(c) at least one coupling agent such that  
the aqueous phase is uniformly distributed in the  
oil phase; and

(d) an alkoxyolated, alkyl substituted  
siloxane surface active agent in an amount so as to  
form a water-in-oil emulsion,

wherein said cosmetic gel composition is a  
water-in-oil emulsion, and wherein a refractive  
index of the composition is in a range of from about  
1.4026 to about 1.4150.

2. A clear cosmetic gel composition according  
to claim 1, wherein said refractive index is in a  
range of 1.4050 to about 1.4085.

25 3. A clear cosmetic gel composition according  
to claim 2, wherein said refractive index is in a  
range of from 1.4060 to about 1.4080.

4. A clear cosmetic gel composition according to claim 1, wherein each of (1) a mixture of the aqueous phase and coupling agent, and (2) a mixture of the oil phase and alkoxylated, alkyl substituted siloxane surface active agent, has a refractive index, a difference between the refractive index of the mixture (1) and the refractive index of the mixture (2) being less than 0.0005.

5  
10 5. A clear cosmetic gel composition according to claim 4, wherein said emulsion has an optical clarity better than approximately 50 NTU.

6. A clear cosmetic gel composition according to claim 1, wherein said cosmetically active ingredient is an antiperspirant active agent.

15 7. A clear cosmetic gel composition according to claim 6, wherein said antiperspirant active agent is incorporated in the composition in an amount sufficient to reduce flow of perspiration when the composition is applied to a human, whereby the clear cosmetic gel composition is a clear antiperspirant gel composition.

20 25 8. A clear antiperspirant gel composition according to claim 7, wherein the antiperspirant active agent is included in the composition in an amount in a range from about 10% to about 35% by weight of the total weight of the composition.

30 9. A clear antiperspirant gel composition according to claim 8, wherein the at least one coupling agent is included in the composition in an amount of from about 10% to about 30% by weight, of the total weight of the composition.

10. A clear antiperspirant gel composition according to claim 9, wherein the alkoxyolated, alkyl substituted siloxane surfactant is included in the composition in an amount of from about 0.2% to about 5 2.0% by weight, of the total weight of the composition.

11. A clear antiperspirant gel composition according to claim 10, wherein a sum of the amount 10 of the alkoxyolated, alkyl substituted siloxane surfactant and the oil phase is from about 8% to about 30% by weight, of the total weight of the composition.

15. 12. A clear antiperspirant gel composition according to claim 11, wherein the composition is a soft gel.

13. A clear antiperspirant gel composition according to claim 11, wherein the composition has a viscosity in a range of from about 75,000 to about 350,000 cps at room temperature (20°-25°C).

20. 14. A clear antiperspirant gel composition according to claim 11, wherein the oil phase also includes a volatile silicone fluid and a non-volatile silicone fluid, and wherein said material having a refractive index in the range of 1.40 to 25 1.50 is an emollient.

30. 15. A clear antiperspirant gel composition according to claim 14, wherein said emollient has a higher refractive index than that of said volatile silicone fluid and that of said non-volatile silicone fluid.

16. A clear antiperspirant gel composition according to claim 10, wherein a sum of the amount of aqueous phase and of the at least one coupling agent is 70%-90% by weight, of the total weight of the composition, and a sum of the amount of the oil phase and alkoxyLATED, alkyl substituted silicone surface active agent is 10%-30% by weight, of the total weight of the composition.

10 17. A clear antiperspirant gel composition according to claim 16, wherein the aqueous phase further includes at least one component selected from the group consisting of polypropylene glycols.

15 18. A clear antiperspirant gel composition according to claim 17, wherein the at least one component includes tripropylene glycol.

19. A clear antiperspirant gel composition according to claim 18, wherein the alkoxyLATED, alkyl substituted siloxane surface active agent is dimethicone copolyol.

20 20. A clear antiperspirant gel composition according to claim 18, wherein the alkoxyLATED, alkyl substituted siloxane surface active agent is cetyl dimethicone copolyol.

25 21. A packaged antiperspirant gel composition, comprising the composition of claim 18 in a clear package.

30 22. A clear antiperspirant gel composition according to claim 7, wherein the aqueous phase further includes at least one component selected from the group consisting of polypropylene glycols.

23. A clear antiperspirant gel composition according to claim 22, wherein the at least one component includes tripropylene glycol.

5 24. A clear cosmetic gel composition according to claim 1, wherein the aqueous phase further includes at least one component selected from the group consisting of polypropylene glycols.

10 25. A clear cosmetic gel composition according to claim 24, wherein the at least one component includes tripropylene glycol.

15 26. A clear cosmetic gel composition according to claim 1, wherein the cosmetically active ingredient includes at least one deodorant active agent, in an amount so as to provide a deodorizing function, whereby a clear deodorant gel composition is provided.

27. A clear antiperspirant soft gel composition, comprising:

20 (a) an antiperspirant active ingredient, in an amount sufficient to reduce flow of perspiration from a human;

(b) water;

(c) at least one coupling agent;

(d) a volatile silicone fluid;

25 (e) a non-volatile silicone fluid;

(f) an emollient, the emollient having a refractive index in the range of 1.40-1.50; and

(g) an alkoxyolated, alkyl substituted siloxane surface active agent;

5 components (a) - (g) being a water-in-oil emulsion, the emollient being in the oil phase, the composition having a refractive index in a range from about 1.4026 to about 1.4150.

10 28. A clear antiperspirant soft gel composition according to claim 27, the composition including, in percent by weight of the total weight of the composition, 8% - 30% in total of components (d)-(g), said 8% - 30% including 0.2% - 2.0% of said alkoxyolated, alkyl substituted siloxane surface active agent, and 10% - 30% of said at least one coupling agent.

15 29. A clear antiperspirant soft gel composition according to claim 28, wherein the antiperspirant active ingredient is included in the composition in an amount of from about 10% to about 35% by weight, of the total weight of the composition.

20 30. A clear antiperspirant soft gel composition according to claim 29, wherein the emulsion has an optical clarity better than approximately 50 NTU.

25 31. A clear antiperspirant soft gel composition according to claim 30, wherein components (a) - (c) form a mixture having a first refractive index and components (d) - (g) form a mixture having a second refractive index, a difference between the first refractive index and the second refractive index being less than 0.0005.

32. A clear antiperspirant soft gel composition according to claim 31, wherein the composition has a viscosity in a range of from about 75,000 to about 350,000 cps at room temperature (20°-25°C).

5           33. A clear cosmetic gel composition, comprising:

10           (a) an aqueous phase containing (i) water, (ii) at least one cosmetically active ingredient, in an amount so as to have a cosmetic effect, and (iii) at least one polypropylene glycol;

15           (b) an oil phase;

15           (c) at least one coupling agent such that the aqueous phase is uniformly distributed in the oil phase; and

20           (d) an alkoxylated, alkyl substituted siloxane surface active agent in an amount so as to form a water-in-oil emulsion,

20           wherein said cosmetic gel composition is a water-in-oil emulsion.

34. A clear cosmetic gel composition according to claim 33, wherein said at least one polypropylene glycol includes tripropylene glycol.

25           35. A clear cosmetic gel composition according to claim 34, wherein the aqueous phase further includes propylene glycol.

36. A clear cosmetic gel composition according to claim 33, wherein the oil phase includes silicone fluids.

30           37. A method of forming a clear cosmetic gel composition, comprising the steps of:

(a) forming an aqueous-based phase comprising (i) water, (ii) a cosmetically active ingredient, and (iii) at least one coupling agent;

5 (b) forming an oil-based phase containing a material having a refractive index in the range of 1.40-1.50, silicone fluids and an alkoxyolated, alkyl substituted siloxane surface active agent, the aqueous-based phase having a refractive index which differs from a refractive index of the oil-based

10 phase by less than 0.0005; and

(c) mixing the aqueous-based phase and the oil-based phase together so as to form a water-in-oil emulsion, the composition having a viscosity in a range of from about 75,000 to about

15 350,000 cps at room temperature (20°-25°C), and having a refractive index in a range of from about 1.4026 to about 1.4150.

20 38. The method according to claim 37, wherein the aqueous-based phase further includes at least one material selected from the group consisting of polypropylene glycols.

39. The method according to claim 38, wherein the at least one material includes tripropylene glycol.

25 40. The method according to claim 37, wherein said silicone fluids include a volatile silicone fluid and a non-volatile silicone fluid, and wherein the material having a refractive index in the range of 1.40-1.50 is an emollient having a higher refractive index than that of said volatile silicone

30 fluid and said non-volatile silicone fluid.

41. The method according to claim 37, wherein after said mixing the resulting mixture is

transferred to a dispensing container for use by a consumer.

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 96/12773

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 A61K7/32 A61K7/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	US,A,4 822 620 (CHAMBERLAIN PETER ET AL) 18 April 1989  see the whole document ---	1,6-12, 16,19, 26-29
A	EP,A,0 373 499 (COLGATE PALMOLIVE CO) 20 June 1990 see the whole document ---	1-41
A	WO,A,91 08732 (GILLETTE CO) 27 June 1991 see the whole document -----	1-41

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

## \* Special categories of cited documents :

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1 Date of the actual completion of the international search  15 January 1997	Date of mailing of the international search report  24.01.97
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Authorized officer  Sierra Gonzalez, M

**INTERNATIONAL SEARCH REPORT**

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